

APPENDIX A - HYDROGEOLOGY

BACKGROUND

This memorandum involves evaluating the hydrogeology necessary to create the data sets to build a groundwater model. Details on how the hydrogeologic data sets are translated into model data sets are discussed in more detail in **Appendix B - Modeling**.

Available Data

We compiled hydrogeologic data from:

- Existing reports from the U.S. Geological Survey and Colorado Division of Water Resources (see Sources below);
- Well permit completion reports from 148 registered alluvial wells and 61 permitted monitoring wells available from the Colorado Department of Water Resources Well database (CCDWR, 2020); and
- Water level data from monitoring wells located around the NCCI pit provided by J&T Consulting, Inc.

Figure A1 shows the plotted well data with CCDWR permit number. The well data (**Table A1**) includes: PLSS location, depth, yield (gpm), water level when drilled, and depth to bedrock and saturated aquifer thickness calculated from USGS DEM elevation data and geologic logs (if available). Most of the CDWR wells are used for domestic water supply, with a few for municipal, irrigation, stock and monitoring uses. Water well depth to bedrock range from 20 to 73 feet and average 43 feet, and well yields range from 4 gpm for domestic wells to 2000 gpm for irrigation wells. The depth to water ranges from 2 to 40 feet and averages 15 feet. The calculated saturated alluvial thicknesses range from 2 to 50 feet and average approximately 26 feet.

We segregated the water well data from the more recent monitoring well data to see if there was any difference between older wells and more recent monitoring wells (typically installed around more recent gravel pit construction, which are more likely affected by dewatering. On average, the depth to bedrock is 35 feet (8 feet less); the depth to water is 12 ft (3 feet higher); and the saturated aquifer thickness is 32 ft (6 feet more). Based on this comparison, there is no indication that there has been any significant dewatering of the aquifer since prior to gravel pit development.

Figure A2 shows the location of nine monitoring wells belonging to NCCI (green), four belonging to the City of Thornton (orange) and fifteen belonging to LG-Everist (blue) who owns over a dozen gravel pits located south of the NCCI pit (shaded). Other non-LGE pits also shaded exist north of the pit. Determining which well permits (**Table A1**) correspond with pit monitoring wells was not in the scope of this study.

HYDROGEOLOGY

Figure A3 shows the surficial geology (Soister, 1965) from the Platteville and Fort Lupton Geologic Quadrangles. The surficial geology consists recently deposited sand and gravel alluvial deposits (Qal and Qrg) located adjacent to the SPR river channel and are considered to have relatively high permeability. Older terrace alluvium (Qss, Qs, Qrf) borders the younger alluvium outside the modern floodplain. Together, the floodplain and terrace deposits make up SPR Alluvial Aquifer. The Little Dry Creek (LDC) alluvial aquifer consists mostly of alluvial sand and silt (Qss) with narrow band of Qal adjacent to LDC. The lack of Qal beneath LDC implies a relative lower permeability. The alluvial aquifer is bounded by the relatively low permeability Laramie and Dawson bedrock formations. Minor windblown eolian sand (Qes) and loess (Ql) deposits overly both bedrock and stream alluvium and contribute precipitation recharge directly to the SPR and LDC alluvial aquifers.

Predevelopment Water Table Map

We used our steady state groundwater model to create a representative pre-development water table surface. The water table is strongly controlled by the elevation of the SPR and LDC as described in **Appendix B – Modeling**. **Figure A4** shows how the model results closely match predevelopment contours produced by the USGS (Robson, 2003) along with the available data from the State's database (CDWR, 2020). The steady state water table was directly used to:

- Calculate the aquifer saturated thickness discussed below;
- Determine long-term impacts caused by various pit groups; and
- Used as input into the transient groundwater model (discussed below) to evaluate seasonal conditions and estimate perimeter drain flow.

Groundwater flows perpendicular to the contours and general toward the river. The contours show that the water table generally flows from the northwest to the southeast across the model area at a gradient controlled by the river. Overall, the water table drops from an elevation of approximately 4920 feet to elevation 4830 ft (90 ft) from south to north. A steeper gradient (closer contours) comes from the west through lower permeability terrace deposits.

Top of Bedrock Elevation

Figure A5 shows the calculated top of bedrock elevations calculated by subtracting the depth to bedrock reported in well logs obtained from the State's well database. The calculated values are typically within 5 feet of the contours derived from the SPDSS groundwater model.

Aquifer Saturated Thickness

Figure A6 shows saturated aquifer thicknesses values where well logs are available in the CDWR database. The value is calculated by subtracting the depth to "bedrock," from the reported depth to water. Greater than (>) signs are used as prefixes for shallow wells that were not drilled deep enough to encounter "bedrock". The saturated thickness contours were obtained by subtracting the bedrock surface elevation of model cells (**Figure A5**) from the steady state model heads (**Figure A4**). The contours show that the saturated aquifer thickness around the NCCI pit ranges from 30 to approximately 35 feet deep and is generally the same beyond the SPR.

Aquifer Permeability/Hydraulic Conductivity (K)

Aquifer properties were chosen with guidance from values published in the South Platte Decision Support System (SPDSS) groundwater model (CDM-Smith, 2006). The SPDSS used contoured K values increasing from west to east across the alluvial aquifer. In the southern study area, the K of the LDC alluvium progressively increases from 350 ft/day to 550 ft/day beneath the SPR. In the northern study area near the NCCI pit, the K of the SPR alluvium increases from approximately 550 ft/day to 600 ft/day toward the SPR. We initially used a uniform value of K = 550 ft/day for most of the alluvium with a saturated aquifer thickness greater than 20 ft, but lowered that to a uniform K = 350 ft/day during calibration of the transient model. Calibration also led us to lower K to 200 ft/day along the west edge of the alluvium (terrace areas) and to 50 ft/day for the eolian areas to the west of the alluvial aquifer. For the transient model, we set specific yield (Sy) = 0.20 and found that it worked well for the transient calibration. **Figure A7** shows the K values used in the transient model.

REFERENCES

References are included in the main body of the report.

Appendix A - Figures

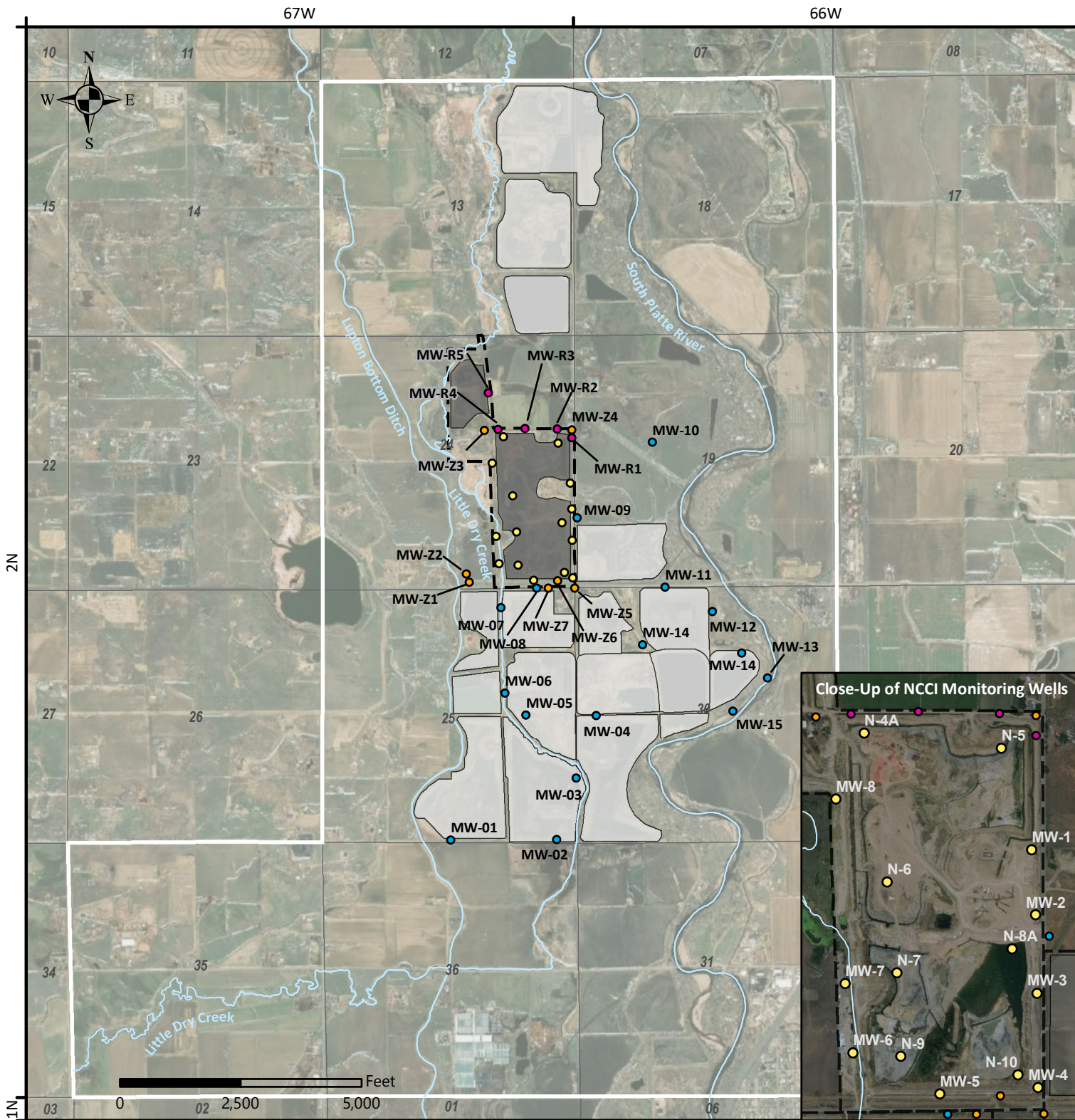


Figure A2
Monitoring Wells

NCCI Pit
Weld County, Colorado

Map Legend

- Property Boundary
- NCCI Pit Study Area
- NCCI Pit
- Adjacent Pit
- L.G. Everist Monitoring Well
- City of Thornton Monitoring Well (Z Wells)
- Rankin Monitoring Well
- NCCI Monitoring Well

Sources:
CDSS Well Permit Database 06.07.2020, J&T Consulting
MW/Pit Location Drawings, NHD (photorevised), ESRI
World Imagery (2018)

Date: November 13, 2020
Datum/Projection: NAD83/Colorado State
Plane North, feet



McGrane Water
Engineering, LLC

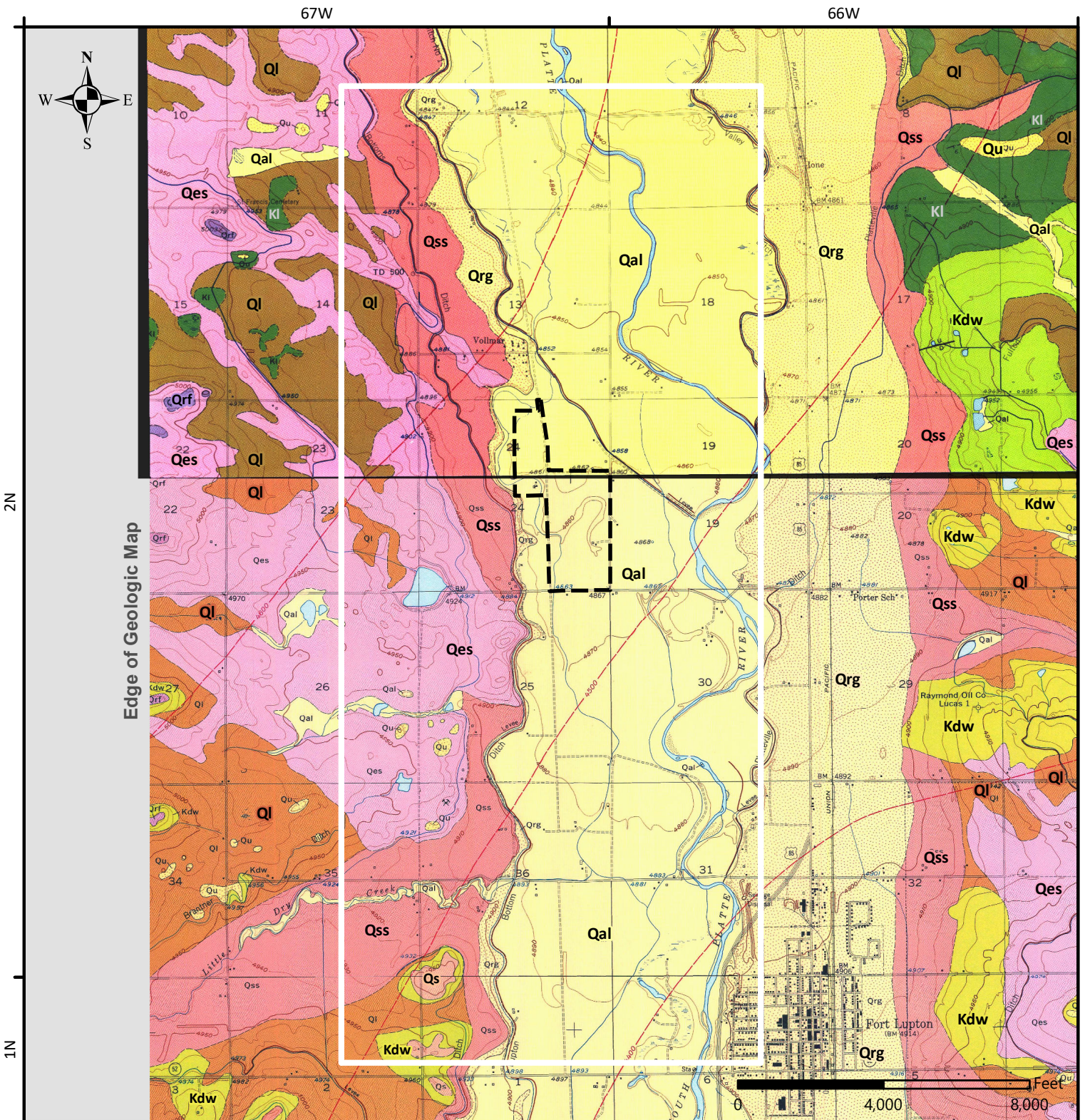


Figure A3 - Surficial Geology

From: Soister, 1965

NCCI Pit
Weld County, Colorado

Map Legend

Property Boundary

Model Boundary

Geologic Units

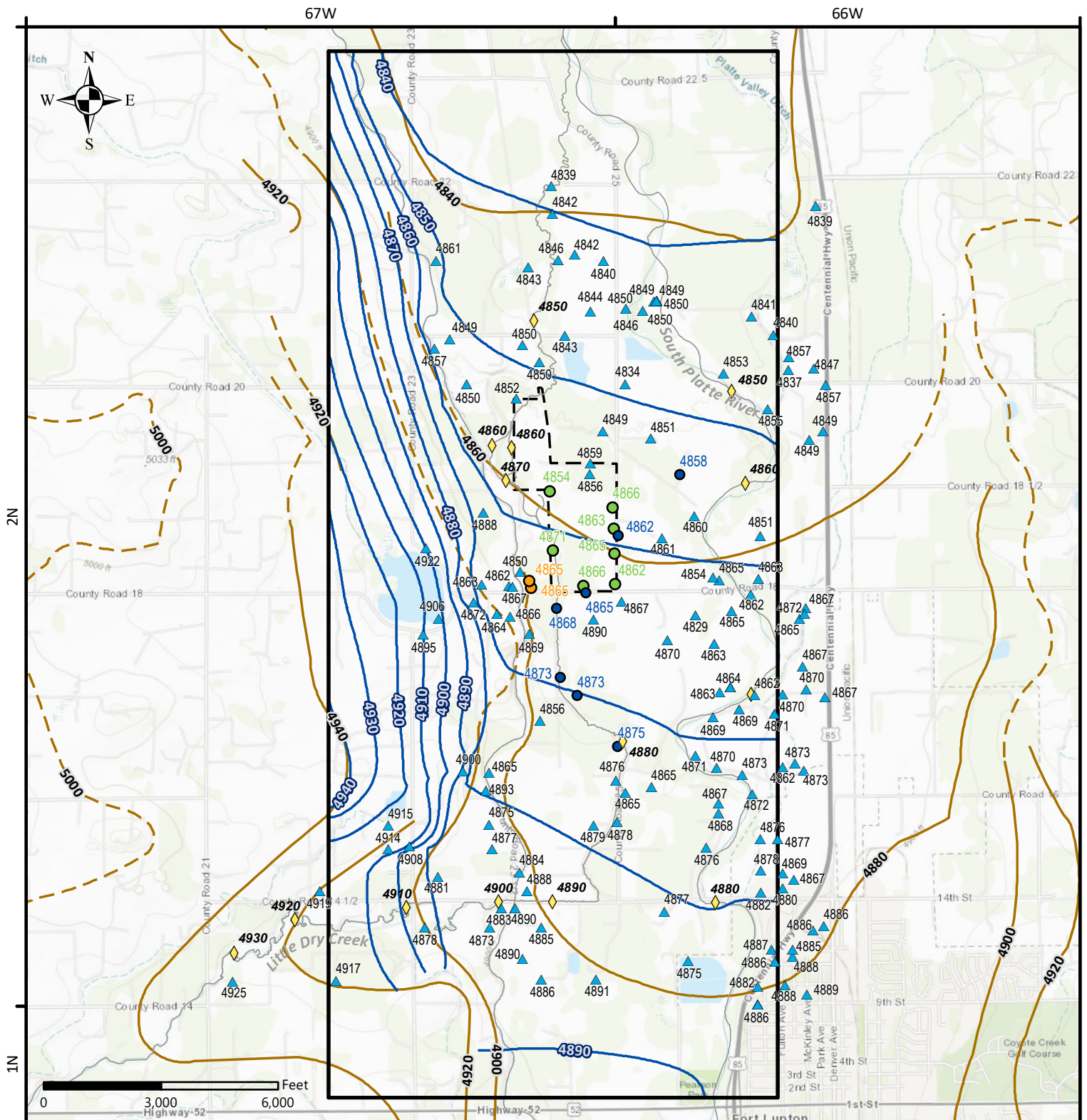
- Qal - Alluvium
- Qes - Eolian Sand
- Qss - Alluvial Sand & Silt
- Qrg - River Gravel
- Ql - Loess
- Qs - Slocum Alluvium
- Qrf - Rocky Flats Alluvium
- Kdw - Dawson Formation
- Kl - Laramie Formation

Sources:
J&T Consulting MW/Pit Location Drawings, Soister (1965)-
Platteville and Fort Lupton Geologic Quadrangles [USGS
Maps GQ-397 and GQ-399]

Date: November 13, 2020
Datum/Projection: NAD83/Colorado State
Plane North, feet



McGrane Water
Engineering, LLC



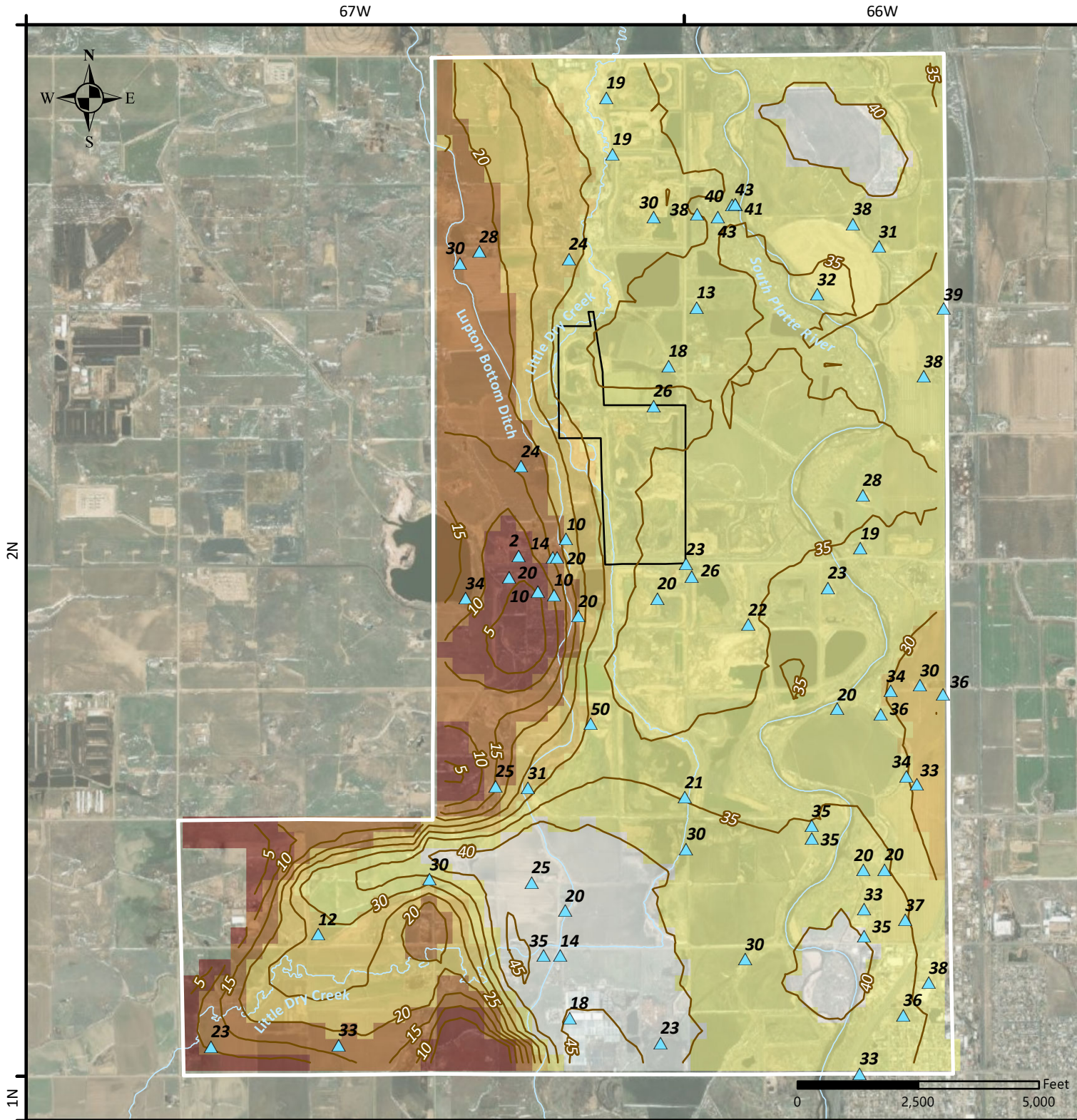


Figure A6
Aquifer Saturated Thickness

NCCI Pit
Weld County, Colorado

Map Legend

□ NCCI Pit Study Area

□ Property Boundary

▲ DWR Constructed Well
with Saturated
Thickness (ft)*

*Only those wells with bedrock and
static water level data are displayed.

Saturated Thickness (feet)

< 10' 20' to 30' 40' to 48'
10' to 20' 30' to 40'

~ Saturated Thickness Contour
Contour Interval = 5 ft

Note: Contours created by subtracting SPDSS
(2013) bedrock elevation from MWE steady
state pre-development water table.

Sources:
CDSS Well Permit Database 06.07.2020, J&T Consulting
MW/Pit Location Drawings, NHD (photorevised), SPDSS
gals raster dataset (2006), ESRI World Topo Map

Date: November 17, 2020
Datum/Projection: NAD83/Colorado State
Plane North, feet

McGrane Water
Engineering, LLC

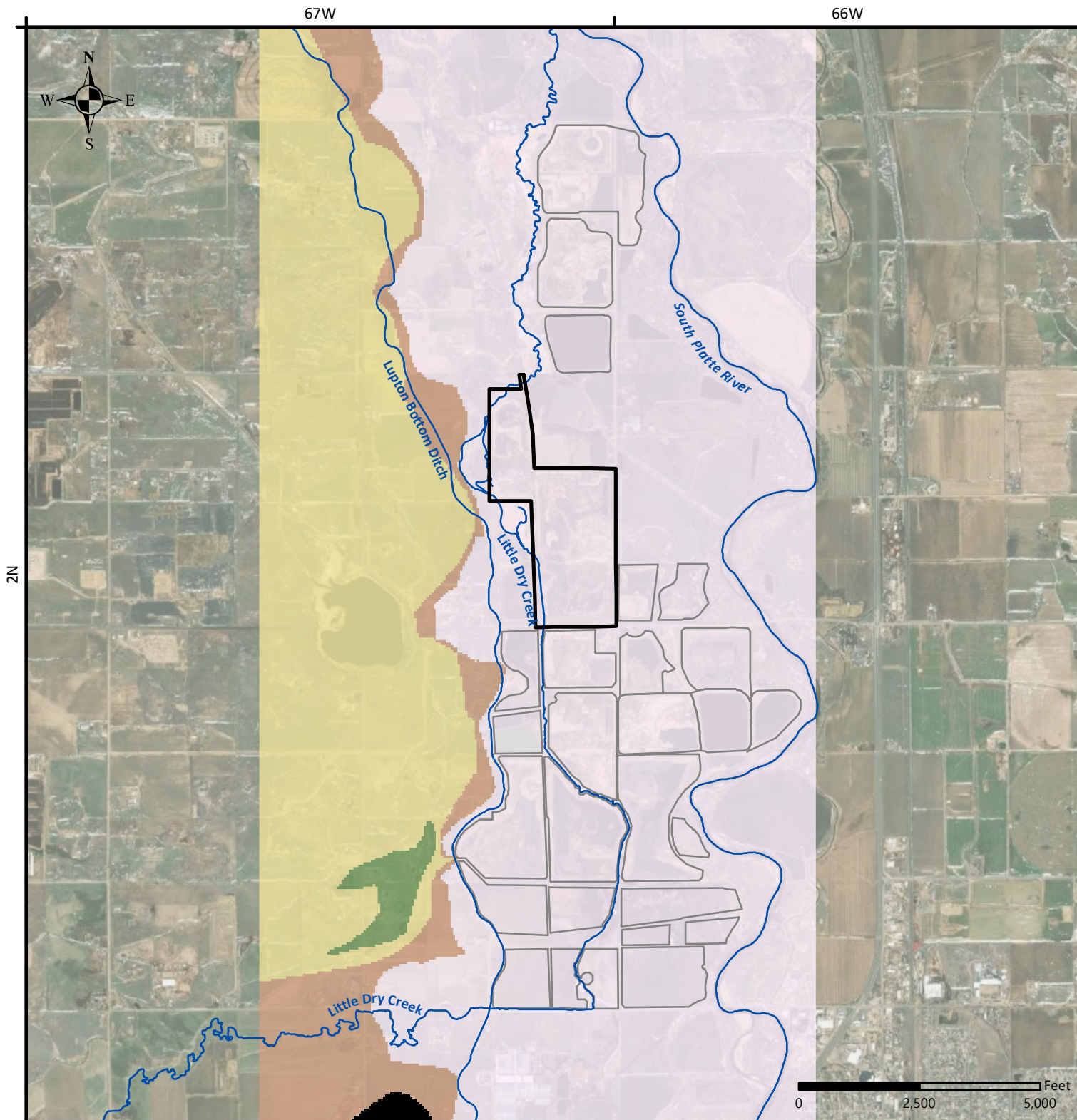


Figure A7 **Transient Model** **Hydraulic Conductivity**

NCCI Pit
Weld County, Colorado

Map Legend

- Property Boundary
- Adjacent Pit

Transient Model Hydraulic Conductivity (ft/day)

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 50 | <ul style="list-style-type: none"> 200 350 No Flow |
|--|---|

Sources:
CDSS Well Permit Database 06.07.2020, J&T Consulting
MW/Pit Location Drawings, NHD (photorevised), MWE
Transient Model K Output, ESRI World Topo Map

Date: November 17, 2020
Datum/Projection: NAD83/Colorado State
Plane North, feet



McGrane Water
Engineering, LLC

Table A1 - CDWR Wells (Page 1 of 4)

Permit	Town-ship	Rnge	Sec	Q160	Q40	Use1	Depth to Bedrock (ft bgs)	Bedrock Elevation (fmsl)	Well Depth (ft bgs)	Well Yield (gpm)	Static Water Level when Drilled (ft bgs)	Static Water Level Elevation	Pumping Water Level	Saturated Thickness (ft)	Applicant Name	Ground Surface Elevation (10m DEM) (ft amsl)	Link to State Database
47721-F	2 N	67 W	13	NE	NW	Commercial	--	--	72	40	4	4839	15	--	MINDEL JOHN T & RINK LAURANNE P	4842.9	https://dwr.state.co.us/Tools/WelPermits/0401004
10030-F	2 N	66 W	31	SW	SE	Commercial	--	--	35	680	10	4875	28	--	FT LIFTON CITY OF	4865.5	https://dwr.state.co.us/Tools/WelPermits/0600240
261574	2 N	66 W	30	NW	SE	Commercial	--	--	27	50	7	4863	24	--	EVERIST L G INC, AN IOWA CORPORATION	4870.4	https://dwr.state.co.us/Tools/WelPermits/0533593
244547	2 N	67 W	24	SE	NE	Commercial	--	--	24	20	--	--	--	--	CONSTRUCTORS INC (ZADEL CHRIS)	4881.4	https://dwr.state.co.us/Tools/WelPermits/0484751
945-MCB	2 N	67 W	36	NW	NE	Domestic	--	--	36	--	12	4879	--	--	FINAKOSHI, H	4906.6	https://dwr.state.co.us/Tools/WelPermits/0569045
84389-A	2 N	66 W	36	NE	NE	Domestic	--	--	36	--	28	4865	--	--	OTTESEN INC	4877.3	https://dwr.state.co.us/Tools/WelPermits/0083318
81-MCB	2 N	67 W	35	SE	SE	Domestic	--	--	42	--	17	4865	--	--	WALTON, JOSEPH H	4907.3	https://dwr.state.co.us/Tools/WelPermits/0500101
38386-A	2 N	67 W	13	SW	SW	Domestic	55	4857	42	15	25	4857	--	30	KEER ROBERT AND MARY ANN	4862.3	https://dwr.state.co.us/Tools/WelPermits/0544459
29447-A	2 N	67 W	24	NE	NE	Domestic	28	4841	28	15	10	4849	--	18	GEE TRUST WILLIAM E	4893	https://dwr.state.co.us/Tools/WelPermits/3648729
28003-A	2 N	67 W	24	SE	SW	Domestic	35	4850	45	25	25	4850	--	10	DWYER DENTON	4874.7	https://dwr.state.co.us/Tools/WelPermits/3673472
25549-A	2 N	67 W	25	SW	SW	Domestic	45	4875	45	4	20	4900	--	25	BURGO NOLA	4919.5	https://dwr.state.co.us/Tools/WelPermits/0518497
25158-A	2 N	67 W	35	NE	NE	Domestic	55	4878	55	10	25	4908	--	30	ESPINOZA DON L	4933	https://dwr.state.co.us/Tools/WelPermits/366581
222341-A	2 N	67 W	25	NW	NE	Domestic	60	4852	60	7	--	4872	--	20	WELLS TJ & MARY	4912.3	https://dwr.state.co.us/Tools/WelPermits/3629283
215110-A	2 N	66 W	30	NE	SE	Domestic	50	4840	53	15	20	4870	--	30	CRAWFORD TERRY LEE & RONDA KAY NAB	4889.6	https://dwr.state.co.us/Tools/WelPermits/0439598
20306-F	2 N	66 W	31	NE	SW	Domestic	53	4847	54	--	--	4882	--	35	ANDERSON O FRED	4900.3	https://dwr.state.co.us/Tools/WelPermits/0602754
198087-A	2 N	67 W	36	NE	SW	Domestic	38	4864	40	15	18	4894	--	20	DOUGLASS BONITA	4901.9	https://dwr.state.co.us/Tools/WelPermits/0461759
190186-A	2 N	66 W	31	SW	NW	Domestic	42	4867	49	15	12	4872	--	30	TRICYCLE LANE TEXAS LLC	4895.5	https://dwr.state.co.us/Tools/WelPermits/3660269
183741-A	2 N	66 W	31	NW	NE	Domestic	50	4853	50	15	15	4868	--	35	STITTNER JAMES A & PHYLLIS	4893	https://dwr.state.co.us/Tools/WelPermits/3661677
183741-A	2 N	67 W	36	NE	NE	Domestic	35	4848	40	15	5	4878	--	30	EVERIST L G INC, AN IOWA CORPORATION	4882.8	https://dwr.state.co.us/Tools/WelPermits/0370498
162220-A	2 N	67 W	24	SW	SE	Domestic	30	4848	55	15	36	4862	--	14	RAKOWSKI SANDRA B	4897.6	https://dwr.state.co.us/Tools/WelPermits/3612772
162519-A	2 N	67 W	24	SW	SE	Domestic	30	4847	50	15	30	4867	--	20	BORNHOFF THOMAS & MICHELLE	4897.3	https://dwr.state.co.us/Tools/WelPermits/0358532
156312-A	2 N	66 W	30	NE	NW	Domestic	32	4842	34	--	9	4865	--	23	HILL GOMER	4874.4	https://dwr.state.co.us/Tools/WelPermits/0368948
151399-A	2 N	66 W	30	SE	NE	Domestic	53	4836	55	15	19	4870	--	34	TRICYCLE LANE TEXAS LLC (H-NE)	4889.1	https://dwr.state.co.us/Tools/WelPermits/032789
151388-A	2 N	66 W	30	SE	NW	Domestic	55	4835	55	14	19	4871	--	36	TRICYCLE LANE TEXAS LLC (H-NE)	4889.9	https://dwr.state.co.us/Tools/WelPermits/3661834
14779-A	2 N	66 W	31	NW	NE	Domestic	50	4832	50	15	15	4867	--	35	STITTNER JAMES A & PHYLLIS	4881.5	https://dwr.state.co.us/Tools/WelPermits/3661670
14779-A	2 N	67 W	24	SE	SE	Domestic	27	4855	28	15	15	4876	--	21	POWNER LAND & CATTLE CO	4881.9	https://dwr.state.co.us/Tools/WelPermits/0011813
14270-A	2 N	67 W	24	NE	SW	Domestic	28	4864	35	15	4	4888	--	24	WELCO VENTURE	4892	https://dwr.state.co.us/Tools/WelPermits/00108608
14264-A	2 N	67 W	13	SE	SW	Domestic	42	4856	50	20	21	4850	--	24	WATKINS, J	4870.8	https://dwr.state.co.us/Tools/WelPermits/0237795
14191-A	2 N	67 W	13	SE	NW	Domestic	48	4856	50	20	21	4850	--	10	PALEY ROBERT W & BARBARA A	4903.9	https://dwr.state.co.us/Tools/WelPermits/0065274
15196-A	2 N	67 W	36	NW	NE	Domestic	48	4854	58	38	38	4864	--	10	DAC-HOFER ROSS & PAMELA	4902.2	https://dwr.state.co.us/Tools/WelPermits/0204895
104331-A	2 N	67 W	36	NW	NE	Domestic	58	4852	55	--	30	4877	--	25	FUNAKO SHI SAM	4906.6	https://dwr.state.co.us/Tools/WelPermits/0512795
292184	2 N	66 W	30	NW	SE	Domestic	--	--	40	--	--	--	--	--	L G EVERIST INC	4870.4	https://dwr.state.co.us/Tools/WelPermits/3661674
29181-A	2 N	67 W	25	SE	SW	Domestic	--	--	30	--	--	--	--	--	GUIERREZ, CRYSTAL	4908.5	https://dwr.state.co.us/Tools/WelPermits/3669563
284497	2 N	67 W	24	NE	NE	Domestic	--	--	18	--	--	--	--	--	GEE TRUST WILLIAM E	4885.3	https://dwr.state.co.us/Tools/WelPermits/3648725A
275797	2 N	66 W	30	NE	NE	Domestic	--	--	8	--	2	4922	--	--	BALDEAS MANUEL & ANITA	4893.9	https://dwr.state.co.us/Tools/WelPermits/360546
267441	2 N	67 W	31	NE	SW	Domestic	53	4845	53	15	20	4878	--	33	SOUTHLATTE HISTORICAL SOCIETY	4897.9	https://dwr.state.co.us/Tools/WelPermits/360771
266881	2 N	67 W	36	NE	SE	Domestic	--	--	10	--	--	--	--	--	EVERIST L G INC, AN IOWA CORPORATION	4887.5	https://dwr.state.co.us/Tools/WelPermits/0549900
266486	2 N	66 W	31	NE	NW	Domestic	38	4856	40	12	19	4876	--	20	SOUTHLATTE HISTORICAL SOCIETY	4893.5	https://dwr.state.co.us/Tools/WelPermits/0538730
258579	2 N	67 W	13	NE	NE	Domestic	--	--	19	--	--	--	--	--	SW CHAMBERS LLC	4845.9	https://dwr.state.co.us/Tools/WelPermits/0527076
258578	2 N	67 W	13	NE	NW	Domestic	--	--	19	--	--	--	--	--	SW CHAMBERS LLC	4844.8	https://dwr.state.co.us/Tools/WelPermits/0527078
258577	2 N	67 W	13	NE	SE	Domestic	--	--	19	--	5	4843	--	--	SW CHAMBERS LLC	4847.8	https://dwr.state.co.us/Tools/WelPermits/0527076H
258576	2 N	67 W	13	NE	SE	Domestic	--	--	19	--	7	4842	--	--	SW CHAMBERS LLC	4848.6	https://dwr.state.co.us/Tools/WelPermits/0527076G
258575	2 N	66 W	18	SW	NW	Domestic	--	--	19	--	--	--	--	--	SW CHAMBERS LLC	4854.9	https://dwr.state.co.us/Tools/WelPermits/0527076F
258573	2 N	66 W	18	SW	SW	Domestic	--	--	22	--	--	--	--	--	SW CHAMBERS LLC	4855.9	https://dwr.state.co.us/Tools/WelPermits/0527076D
258572	2 N	67 W	13	SE	NW	Domestic	20	4829	19	--	--	--	--	--	SW CHAMBERS LLC	4848.7	https://dwr.state.co.us/Tools/WelPermits/0527076C
258571	2 N	67 W	13	SE	NW	Domestic	20	4829	19	--	--	--	--	--	SW CHAMBERS LLC	4853	https://dwr.state.co.us/Tools/WelPermits/0527076B
258570	2 N	67 W	18	NW	SW	Domestic	53	4818	32	--	--	--	--	--	SW CHAMBERS LLC	4850.6	https://dwr.state.co.us/Tools/WelPermits/0527076A
254359	2 N	67 W	25	SW	SW	Domestic	--	--	25	--	--	--	--	--	BURGO NOLA	4900.1	https://dwr.state.co.us/Tools/WelPermits/0518497A
254301	2 N	67 W	35	SW	SE	Domestic	--	--	25	--	--	--	--	--	MOFFING, KENNETH J	4904	https://dwr.state.co.us/Tools/WelPermits/0517754
243932	2 N	66 W	18	SW	NW	Domestic	44	4808	45	--	6	4846	--	30	STALL, ROBERT	4851.9	https://dwr.state.co.us/Tools/WelPermits/0506546
243779	2 N	66 W	19	SE	NW	Domestic	53	4833	53	15	25	4851	--	28	PARKER, DO-LD A	4875.7	https://dwr.state.co.us/Tools/WelPermits/0476166
239875	2 N	67 W	25	NE	NW	Domestic	40	4849	50	--	20	4869	--	20	DOODGE REDDY E & LISA L	4869.4	https://dwr.state.co.us/Tools/WelPermits/0487463
226861	2 N	66 W	31	NE	NW	Domestic	38	4857	40	12	18	4877	--	20	SOUTHLATTE VALLEY HIST. SOCIETY	4895.3	https://dwr.state.co.us/Tools/WelPermits/049798
189328	2 N	66 W	19	SW	SE	Domestic	--	--	53	15	15	4854	--	--	BEARSON, DARRELL L	4868.6	https://dwr.state.co.us/Tools/WelPermits/0381705
174064	2 N	66 W	18	SW	SW	Domestic	36	4821	40	15	23	4834	--	13	COVIE LAURA & MEL	4857.2	https://dwr.state.co.us/Tools/WelPermits/0359255
173913	2 N	67 W	36	NW	NW	Domestic	30	4841	32	--	--	4867	--	26	AUDOMA CITY OF	4870.3	https://dwr.state.co.us/Tools/WelPermits/0314243
153021	2 N	67 W	19	NE	SE	Domestic	45	4841	35	--	--	--	--	--	AUDOMA CITY OF	4870.3	https://dwr.state.co.us/Tools/WelPermits/0314243
153020	2 N	66 W	19	NE	SE	Domestic	45	4841	35	--	--	--	--	--	BAUGERT REAVIS	4872.6	https://dwr.state.co.us/Tools/WelPermits/02535144
153020	2 N	66 W	19	NE	NE	Domestic	40	4849	40	--	--	--	--	--	BAUGERT REAVIS	4872.6	https://dwr.state.co.us/Tools/WelPermits/0066590
151399	2 N	66 W	30	SE	NE	Domestic	--	--	40	--	--	--	--	--	NA EWING	4889.1	https://dwr.state.co.us/Tools/WelPermits/0066590
148836	2 N	66 W	30	SW	SE	Domestic	--	--	30	--	--	--	--	--	FRANKIN CHARLES M & PENNY J	4882	https://dwr.state.co.us/Tools/WelPermits/0011846
124264	2 N	67 W	13	SE	SW	Domestic	--	--	32	--	--	--	--	--	MARTINEZ, ROBERT L	4870.7	https://dwr.state.co.us/Tools/WelPermits/0223784
93439	2 N	66 W	30	NE	NE	Domestic	--	--	35	--	12	4872	--	--	COUNTER BEN F & MARJORIE L	4884.4	https://dwr.state.co.us/Tools/WelPermits/0065971
80437	2 N	66 W	30	NW	SE	Domestic	--	--	40	--	--	--	--	--	DITA FARMS	4870.4	https://dwr.state.co.us/Tools/WelPermits/0065971

Table A1 - CDWR Wells (Page 2 of4)

Permit	Township	Range	Section	Q160	Q40	Use1	Depth to Bedrock (ft bgs)	Bedrock Elevation (fmsl)	Well Depth (ft bgs)	Well Yield (gpm)	Static Water Level when Drilled (ft bgs)	Static Water Level Elevation	Pumping Water Level	Saturated Thickness (ft)	Applicant Name	Ground Surface Elevation (ftm DEM)	Link to State Database
23889	N	67 W	13	SW	SW	Domestic	58	4831	60	2	4849	4849	---	28	ZWARTIES, WILLIAM J	4875	https://dwr.state.co.us/Tools/WaterPermits/9063280
24567	N	67 W	13	SW	SW	Domestic	57	4830	7	15	4850	4850	---	14	TULLMAN, ROBERT L	4875	https://dwr.state.co.us/Tools/WaterPermits/9063280
43756	N	66 W	18	NE	NE	Domestic	2	4876	46	1	4893	4893	---	14	CLINT LAND CATTLE CO	4893.2	https://dwr.state.co.us/Tools/WaterPermits/9063530
43756	N	66 W	18	NE	NE	Domestic	41	4870	41	---	4893	4893	---	20	CLINT, LESTER N	4913.3	https://dwr.state.co.us/Tools/WaterPermits/9063530
43756	N	66 W	25	NE	NE	Domestic	41	4872	41	---	4893	4893	---	34	WELLS, BARBARA D	4913.3	https://dwr.state.co.us/Tools/WaterPermits/9063530
43815	N	66 W	25	NE	NE	Domestic	30	4841	42	15	4893	4893	---	15	CARY, CHAD L & KAY L	4913.8	https://dwr.state.co.us/Tools/WaterPermits/9063530
43822	N	66 W	35	SE	SW	Domestic	30	4841	42	15	4893	4893	---	15	CARY, CHAD L & KAY L	4913.8	https://dwr.state.co.us/Tools/WaterPermits/9063530
27901	N	67 W	35	SE	SW	Domestic	30	4841	42	15	4893	4893	---	21	KNOTS, WILLIE K	4904.41	https://dwr.state.co.us/Tools/WaterPermits/9063476
27901	N	67 W	35	SE	SW	Domestic	30	4841	42	15	4893	4893	---	21	KNOTS, WILLIE K	4904.41	https://dwr.state.co.us/Tools/WaterPermits/9063476
25158	N	67 W	35	NE	NE	Domestic	29	4878	51	---	4878	4878	---	17	JONES, GUY H	4897.6	https://dwr.state.co.us/Tools/WaterPermits/9063476
23110	N	67 W	35	NE	NE	Domestic	29	4878	51	---	4878	4878	---	17	JONES, GUY H	4897.6	https://dwr.state.co.us/Tools/WaterPermits/9063476
15680	N	67 W	35	NE	NE	Domestic	40	4895	40	10	4915	4915	---	30	ESPINOZA, CIANO L & JONN R	4913.3	https://dwr.state.co.us/Tools/WaterPermits/9062971
14399	N	67 W	35	NE	NE	Domestic	23	4907	35	14	4911	4911	---	12	ESPINOZA, CIANO L & JONN R	4930.1	https://dwr.state.co.us/Tools/WaterPermits/9062971
13093	N	67 W	35	NE	NE	Domestic	26	4872	36	18	4890	4890	---	18	SANCHEZ, RICARDO	4897.6	https://dwr.state.co.us/Tools/WaterPermits/9062971
9722	N	67 W	13	SE	SW	Domestic	25	4850	25	---	4850	4850	---	30	KOENIG, JESS	4856.5	https://dwr.state.co.us/Tools/WaterPermits/9061472
9527	N	67 W	36	SE	SW	Domestic	60	4873	60	27	4873	4873	---	30	RUIZ/VALCABA, JOSE G	4899.6	https://dwr.state.co.us/Tools/WaterPermits/9060176
9495	N	67 W	13	SE	NE	Domestic	34	4814	28	4	4844	4844	---	2	HEIT, CASPER	4847.8	https://dwr.state.co.us/Tools/WaterPermits/9060176
291633	N	67 W	24	SW	SE	Household	42	4861	52	40	4863	4863	---	2	RAMSEY, HERBERT A	4897.6	https://dwr.state.co.us/Tools/WaterPermits/9062988
224181	N	67 W	13	SE	SE	Household	60	4850	60	15	4850	4850	---	50	VARGAS, LEO -RD K	4879.6	https://dwr.state.co.us/Tools/WaterPermits/90612025
224181	N	67 W	24	NE	NE	Household	60	4850	60	15	4850	4850	---	50	VARGAS, LEO -RD K	4879.6	https://dwr.state.co.us/Tools/WaterPermits/90612025
63203	N	67 W	36	SW	NE	Household	50	4848	50	---	4882	4882	---	35	ZADEL FAMILY LLP	4882.5	

Table A1 - CDWR Wells (Page 3 of 4)

Permit	Town-ship	Rge	Sec	Q160	Q40	Use1	Depth to Bedrock (ft bgs)	Bedrock Elevation (fmsl)	Well Depth (ft bgs)	Well Yield (gpm)	Static Water Level - When Drilled (ft bgs)	Static Water Level Elevation	Pumping Water Level	Saturated Thickness (ft)	Applicant Name	Ground Surface Elevation (10m DEM) (ft amsl)	Link to State Database
12670-R	2 N	66 W	30	NE	NE	Irrigation	--	--	52	--	16	4867	--	--	ANDERSON, L R	4863.3	https://divr.state.co.us/Tools/WellPermits/9061230
12596-R	2 N	66 W	19	NE	NE	Irrigation	--	--	55	--	16	4819	--	--	BANGERT, R T MRS	4865.2	https://divr.state.co.us/Tools/WellPermits/9061209
12231-F	2 N	66 W	31	NE	SE	Irrigation	55	4830	55	1200	18	4867	40	37	EWING, MARY	4885.5	https://divr.state.co.us/Tools/WellPermits/9061081
11170-R	2 N	67 W	25	SW	SE	Irrigation	--	--	51	--	20	4893	--	--	EWING, A C	4873.3	https://divr.state.co.us/Tools/WellPermits/9060593
11082-F-R	2 N	66 W	30	NW	SE	Irrigation	--	--	45	--	15	4864	--	--	DIRRO, JOHN JR	4879.2	https://divr.state.co.us/Tools/WellPermits/9060564
11081-F	2 N	66 W	30	NW	SE	Irrigation	--	--	45	--	15	4864	--	--	DIRRO, JOHN JR	4879.2	https://divr.state.co.us/Tools/WellPermits/9060564
10811-F	2 N	66 W	19	NE	NW	Irrigation	--	--	39	1400	6	4855	--	--	CANNON LAND CO	4860.7	https://divr.state.co.us/Tools/WellPermits/9060484
1050-R	2 N	67 W	36	NW	SW	Irrigation	--	--	66	--	34	4881	--	--	KOSHIO, KATY S	4914.5	https://divr.state.co.us/Tools/WellPermits/9058643
1049-R	2 N	67 W	36	SE	NW	Irrigation	--	--	28	--	6	4886	--	--	KNOTA, WILIE K	4881.2	https://divr.state.co.us/Tools/WellPermits/9058642
1048-R	2 N	67 W	31	SE	SW	Irrigation	--	--	39	--	--	4885	--	--	ASHBY, KENNETH	4905.3	https://divr.state.co.us/Tools/WellPermits/9058457
75962-F	2 N	66 W	31	SE	SE	Municipal	53	4849	55	500	17	4885	28	36	FORT LUTPON, CITY OF	4902.2	https://divr.state.co.us/Tools/WellPermits/9060634
14807-R-R	2 N	66 W	31	SE	NE	Municipal	53	4848	55	1100	15	4886	25	38	FORT LUTPON, CITY OF	4902.8	https://divr.state.co.us/Tools/WellPermits/9060634
15301-9	2 N	66 W	19	NE	SE	Stock	--	--	35	--	--	--	--	--	BANGERT, EVANS	4874.9	https://divr.state.co.us/Tools/WellPermits/9063514C
24644	2 N	66 W	30	SW	SW	Stock	--	--	32	--	6	4865	--	--	EWING, HARRY	4870.5	https://divr.state.co.us/Tools/WellPermits/9063062
24643	2 N	66 W	30	SW	SW	Stock	--	--	28	--	6	4865	--	--	EWING, HARRY	4870.5	https://divr.state.co.us/Tools/WellPermits/9063061
16852	2 N	66 W	31	NE	SE	Stock	--	--	37	--	16	4866	--	--	EWING, MARY	4885.5	https://divr.state.co.us/Tools/WellPermits/9063551
14764	2 N	66 W	18	SE	NW	Stock	50	4803	50	--	12	4841	--	38	CANNON LAND CO	4853.2	https://divr.state.co.us/Tools/WellPermits/9061890
11328	2 N	66 W	18	SE	SE	Stock	--	--	32	--	16	4837	--	--	CANNON LAND CO	4853.2	https://divr.state.co.us/Tools/WellPermits/9060675
10279	2 N	66 W	18	SE	SE	Stock	--	--	16	--	6	4847	--	--	CANNON LAND CO	4853.2	https://divr.state.co.us/Tools/WellPermits/9060312
9723	2 N	66 W	18	SE	SE	Stock	--	--	55	--	16	4857	--	--	CANNON LAND CO	4872.5	https://divr.state.co.us/Tools/WellPermits/9060215
Minimum							20	4803	5	4	2	4829	8	2			
Maximum							73	4907	75	2000	40	4925	53	50			
Average							43	4844	41	421	15	4869	30	26			

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Table A1 - CDWR Monitoring Wells (Page 4 of 4)

Permit	Town-ship	Range	Sec	Q40	Use1	Depth to Bedrock (ft bgs)	Bedrock Elevation (fmsl)	Well Depth (ft bgs)	Well Yield (gpm)	Static Water Level when Drilled (ft bgs)	Static Water Level Elevation	Pumping Water Level	Saturated Thickness (ft)	Applicant Name	Ground Surface Elevation (ftm DBM)	Link to State Database
58007-MH	2 N	67 W	25	NE	NE	43	4828	29	---	26	4844	---	23	CITY OF THORNTON	4870.4	https://dwr.state.co.us/Tools/WellPermits/0058007
		66 W	30	NW	NW	43	---	31	---	20	4851	---	23	CITY OF THORNTON	4871.2	https://dwr.state.co.us/Tools/WellPermits/0058006
		65 W	18	NW	NW	43	---	38	---	20	---	---	---	23	BESTWAY CONCRETE	4846.2
58064-MH	2 N	57 W	13	NE	NE	23	4823	23	---	---	---	---	19	BESTWAY CONCRETE	4846.1	https://dwr.state.co.us/Tools/WellPermits/0058052
		67 W	13	NE	SW	23	4827	23	---	---	4846	---	19	BESTWAY CONCRETE	4850.1	https://dwr.state.co.us/Tools/WellPermits/0058051
		67 W	13	NE	SW	23	4827	23	---	---	4846	---	19	BESTWAY CONCRETE	4850.1	https://dwr.state.co.us/Tools/WellPermits/0058052
48616-MH	2 N	66 W	30	NW	NW	46	4807	50	---	---	4850	---	43	BROOMFIELD CITY & CITY	4853.3	https://dwr.state.co.us/Tools/WellPermits/0048166
		66 W	30	NW	SW	46	4807	50	---	---	4850	---	43	BROOMFIELD CITY & CITY	4853.3	https://dwr.state.co.us/Tools/WellPermits/0048166
		66 W	30	NW	SW	46	4807	50	---	---	4850	---	43	BROOMFIELD CITY & CITY	4853.3	https://dwr.state.co.us/Tools/WellPermits/0048166
47511-MH	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4883.2	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36033-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36034-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36029-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36028-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36027-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36026-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36025-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36024-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36023-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36022-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36021-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36020-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36019-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36018-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36017-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36016-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36015-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36014-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36013-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36012-M	2 N	66 W	31	SE	SW	48	4853	34	---	15	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
		66 W	31	SE	SW	48	4853	34	---	---	4886	---	33	GOODSON & ASSOC	4900.8	https://dwr.state.co.us/Tools/WellPermits/0047571
36011-M																